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ABSTRACT

This paper presents an overview of the inservice model used by the National Science Foundation supported Project INLAB (Integrating Laboratory Instruction and Assessment) to challenge and change science teachers' laboratory instruction and assessment practice. The framework that guides the instructional strategies and activities of INLAB is based on the notion of "pedagogical reasoning and action," which emphasizes an intellectual basis and a process for constructing a shared understanding of teaching through reflection. Project participants were 30 middle level (grades 4-9) teachers. In a workshop setting, collaborative dialogue and reflection on current practice helped participants to know and understand the ways of teaching and assessing that lead to change in practice. Evaluation data indicate that 24 out of the 30 participants have changed their laboratory teaching and 27 out of 30 have changed their assessment practice. These findings indicate that Project INLAB provides a model for collaborating with practitioners that fosters professionalism through the establishment of a dialogical and reflective community of learners. Three appendices provide: guidelines and procedures for reflection on current practice; an alternative assessment assignment; and a teachers visiting teachers assignment. (Contains 9 references.) (ND)

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TWENTY-FOUR OUT OF THIRTY = CHANGE

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Running Head: In-Service Model

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Abstract

This paper presents an overview of the in-service model utilized by the National Science Foundation supported project *INLAB* (Integrating Laboratory Instruction and Assessment). The framework and instructional strategies and activities of the in-service model are reported. Specific examples of instructional activities for promoting participant reflection and staff-participant negotiation of a shared understanding of laboratory teaching and assessment practice are included. In addition, project evaluation data are presented.

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TWENTY-FOUR OUT OF THIRTY = CHANGE

Introduction

The purpose of this presentation is to provide an overview of the in-service model utilized in project *INLAB* (Integrating Laboratory Instruction and Assessment) to successfully *challenge* and *change* science teachers' laboratory instruction and assessment practice. The in-service framework and instructional strategies and activities shared illustrate the means by which the project promotes collaborative dialogue and self-reflection among project participants. In addition, project evaluation data presented illustrate the effectiveness of the in-service model.

Theoretical Framework

INLAB is based on the premise that learning is a constructive process. Thus, teachers must construct their own purpose and meaning of laboratory instruction and assessment as it relates to their classroom community and school culture. This construction is facilitated through reflection and the negotiation of a shared meaning among participants and project staff. Further, project participants bring with them what Shulman (1987) refereed to as "wisdom-of-practice" knowledge--that is, participants have existing knowledge of laboratory instruction and assessment. Because these existing conceptions contribute significantly to the meanings constructed by teachers, teachers need to be actively involved, as professionals, in the in-service process (Hart & Robottom, 1990), in order for the in-service experience to become relevant to their existing curricular and instructional approaches (Feely, 1986). By engaging participants in critical reflection upon practice, change is more likely to occur as participants' transform the way practice is experienced and understood (Robottom, 1987). The active participation of teachers, then, enables them to construct the knowledge base necessary to understand and become involved in the innovation. Shulman (1987) identified an array of knowledge that interacts to form ones understanding of teaching. What appears to be missing from Shulman's knowledge base, and which is an emphasis of *INLAB*, is what I call "pedagogical content assessment knowledge." Pedagogical content assessment knowledge is an understanding of how pedagogy, content, and assessment knowledge interplay in the sphere of laboratory teaching and learning.

The In-Service Model

The Framework

The framework that guides the instructional strategies and activities of *INLAB* is based on the notion of "pedagogical reasoning and action," which emphasizes an **intellectual** basis (Shulman, 1987) and a process for constructing a shared understanding of teaching through reflection. To promote an intellectual, reflective atmosphere, *INLAB* instructional strategies and activities involve the presentation of ideas in order to provoke a constructive process to understanding teaching and assessing. This process involves establishing what McNiff (1993) calls a dialogical community. A community of learners where dialogue is on-going and where participants and staff are equals, concerned about each other's understandings of practice and each others' progress. Through continued dialogue and reflection upon practice, participants become to know and understand ways of teaching and assessing that leads to change in practice. The model utilizes the following steps to promote a dialogical, reflective community:

- Modeling "new" ways of knowing and understanding teaching and assessing by project staff;
- Comprehending ways of knowing and understanding teaching and assessing through collaborative dialogue among staff and participants;
- Transforming and applying ways of knowing and understanding teaching and assessing in the classroom context of the participants;
- Reflecting upon the classroom application of ways of knowing and understanding teaching and assessing through videotape analysis and writing;
- Sharing ways of knowing and understanding of teaching and assessing with peers through collaborative dialogue;
- Reflecting upon collaborative dialogue, leading to a "new" comprehension of teaching and assessing; and

- Developing instruction and alternative assessment tools based upon the new comprehension in collaboration with peers.

Modeling and comprehending occur through active participation and collaborative dialogue in workshop settings. The steps of transforming and reflecting are promoted through scholarly readings, writing (reflection assignments), and videotaping of practice, which encourage participants' self-dialogue and reflection upon practice. Sharing and reflecting upon collaborative dialogue occurs in follow-up workshops where participants share and engage in dialogue about their teaching and assessing practices in small groups of staff and peers. The small group sharing leads to further reflection upon practice and a "new" comprehension of practice for both presenter and group members. The written reflections and videotape of practice serve as a focal point for the collaborative dialogue. Developing instruction and alternative assessment tools occurs in small groups of peers and results in the application of ways of knowing and understanding teaching and assessing. The process recycles when participants implement their "new" ways of laboratory teaching and assessing and further reflect upon practice.

Bill and Ray's comments emphasize the importance of establishing a community of learners, which supported collaborative, reflective dialogue:

> *"INLAB has successfully prompted, encouraged, and demanded at times much more discussion between my colleagues and me. The discussions have been very thought provoking and we have struggled, agreed, and disagreed (sometimes vehemently) over implementation of some new ideas".* [Bill].

> *"The collaboration with other teachers in my corporation* [in Indiana, school districts are referred to as corporations] *was most valuable in that we were able to act as sounding boards with each other. We could talk about what we can do, what we should do, and what we would like to do. . . . The collaboration between teachers has given us all new ideas, shown us what we're doing right, and what we're doing wrong"* [Ray].

Both Bill and Ray's responses demonstrate the importance of collaborative group dialogue in promoting teachers' discussion about and understanding of practice; providing insight, as Ray says, into ". . . what we can do, what we should do, and what we would like to do . . . ." Through continued dialogue, participants come to know and understand ways of laboratory teaching and assessment that leads to change in practice.

Instructional Activities

Hubermann (1991) concluded that a successful approach to promoting teacher change is to encourage and support teachers in their "tinkering" with classroom practice. That is, teachers' develop new ways of teaching and assessing and then reflect upon those practices as it relates to their classroom community and school culture. This active participation enabled teachers to construct a knowledge base necessary to understand and become involved in the innovation. Thus, the *INLAB* reflection assignments involve teachers in what Goffmann (1973) refereed to as praxis--doing, reflecting, learning, and changing. To promote praxis, *INLAB* reflection assignments incorporate the elements Stallings (cited in Fullan, 1990) identified as being successful for facilitating reflection and change in practice:

- Teachers analyze their current practice, becoming aware of the need for change;
- Teachers modify ideas and the innovation to fit their classroom community and school culture;
- Teachers evaluate the innovation, the impact on both their teaching and students;
- Teachers observe and reflect upon other teachers' implementation and understanding of the innovation;
- Teachers reflect upon and engage in dialogue about their successes and failures with the innovation; and
- Teachers critique and reflect upon their own teaching through the use of videotape.

The three reflection assignments presented below are representative of *INLAB* assignments and provide examples, or templates, for collaborating with teachers and promoting praxis.

Reflection upon current practice assignment. This initial reflection assignment assisted participants in constructing a profile or portfolio of their laboratory teaching and assessment practice, and to engage them in reflecting upon their current practice (see Appendix A). The purpose of the assignment was two fold: first to engage participants in coming to know and understand their current practice and second to establish a knowledge base for changing practice. An additional aspect of the assignment was to solidify a cadre of teachers committed to understanding and changing their practice. For without teacher commitment, change in practice is unlikely, yet many educational reform processes have neglected this situation (Eisner, 1994).

Although participants found the laboratory profile to be difficult to construct and time consuming, all found the assignment to be interesting and rewarding, and contributed to their understanding of current practice, as represented in the responses of Bill and Peter:

> *"From the very start of INLAB I have had some very valuable teaching lessons. When we videotaped our instructional unit (our first assignment) I learned that as progressive as I thought I was, I teach in a traditional way"* [Bill].

> *"In order to make any changes, one has to know where they are and what they are presently doing. The process was an eye opener for me because it made me step back and think about what, how, and why I was teaching the material and to think about what could be done differently"* [Peter].

Bill and Peters' statements, which are reflective of all participants, illustrate the importance of reflecting on current practice as a means for establishing an understanding of practice and providing a knowledge base for changing practice, as Peter says, "In order to make any changes, one has to know where they are and what they are presently doing."

Alternative assessment assignment. Following the workshop on ways of thinking about assessment and models of alternative assessment techniques, participants developed two alternative assessment prototypes. The purpose of the assignment was to assist participants in constructing an understanding of and a need for alternative assessment techniques (see Appendix B). Specifically, the assignment was to: a) provide participants with practice in developing and implementing alternative assessment techniques, b) assist participants in understanding that different assessment techniques provide different pictures of student performance, and c) promote the need for alternative assessment techniques. The quotations below reflect the responses of participants on the alternative assessment assignment:

> *"The process of trying to come up with the different forms of assessment was worthwhile in that it caused me to stop and really think about how to do something different from what I had been doing"* [Jane].

> *"Having a traditional versus Alternative Assessment assignment was beneficial in that it showed very well that some students did well and some students didn't do well on the tests because of the format. The Alternative Assessment showed that students think very differently from each other, and that all students who received the same information at the same time all processed the information differently"* [Bill].

Jane's response illustrates the importance of the alternative assessment assignment in promoting teachers' thinking about and reflecting upon assessing their students differently. Not only does Bill's reply emphasize the need to think about assessing students differently, but, and perhaps more importantly, the different picture one constructs of students by using different assessment approaches.

Teachers visiting teachers assignment. This reflection assignment provided participants an opportunity to visit other teacher participants, to observe the implementation of their peer developed laboratory instructional

activities and/or alternative assessment techniques. The purpose of the assignment is to provide participants an opportunity to observe and dialogue with colleagues and reflect upon practice as observed in the classroom (see Appendix c). Participant reflection upon the process and the value of observing other teachers is illustrated in the following two responses:

> *"I found it useful to observe one of the activities I had helped formulate for our thematic set being carried out by another teacher. I gathered some useful teaching tips that I plan to try. I received confirmation about the value of the activity. I reflected on the interactions of these students compared with my own students. It was easier for me to observe, hear, and record misconceptions held by students I was not directly involved in helping"* [Susan].

> *"The INLAB format is evident in Bob's classes and I was impressed with how well the students were working with concept maps. I was able to see the value of using concept maps as a classroom activity and will try to incorporate this technique . . . so my students can benefit. This was an excellent experience for me. It allowed me to see another teacher using INLAB techniques and reinforced my confidence in this area"* [Richard].

The above responses demonstrate the advantage of teachers visiting teachers in that both Susan and Richard indicated that they obtained instructional ideas for use in their own classrooms and that it confirmed or reinforced their confidence in their own laboratory teaching. Further, Susan alludes to the value of being able to more closely observe and listen to students, especially attending to their conceptual understandings.

Evaluation Method

Evaluation data consisted of the 30 middle level (grades 4-9) teachers': (1) written reflections upon *INLAB* activities, (2) written responses to two open-ended questions: "How do you think your laboratory teaching has changed?" and "How do you think your assessment practice has changed?" and (3) follow-up interviews about their written responses conducted in an "interview guide" format (Patton, 1990). Methods of single and cross-case analytic induction (Patton, 1990) were combined to analyze the data. The written reflections and interviews were analyzed for patterns, that were then categorized to reflect changes or no changes in laboratory teaching and assessment practice.

Results

Based upon the teachers' written reflections and follow-up interviews, *INLAB* has been successful in promoting participants' re-conceptualization of their laboratory teaching and assessment practice. The evaluation data indicated that 24 out of 30 participants have changed their laboratory teaching (Table 1) and that 27 out of 30 have changed their assessment practice (Table 2).

Conclusion

Project *INLAB* provides a model for collaborating with practitioners that fosters professionalism through the establishment of a dialogical and reflective community of learners. The model can be adapted to other disciplines and teacher enhancement projects, providing a framework and instructional strategies for successfully collaborating with practitioners for reforming practice. *INLAB* assignments and activities have successfully provided the context for participant reflection and collaborative dialogue, facilitating both participant and staff construction of understanding of laboratory teaching and assessment practice. The success of *INLAB* is built upon the establishment of an intellectual community of learners. A community that supports self-reflection, collaborative dialogue, and the negotiation of a shared understanding of teaching and assessing.

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References

Eisner, E.W. (1994). *Cognition and curriculum reconsidered* (2nd ed.). New York: Teachers College Press.

Feely, J. (1986). Reading practices in schools: Linking theory with practice. ERIC, ED 269 734.

Fullan, M. (1990). Staff development, innovation and instructional development. In B. Joyce (Ed.), *Changing school culture through staff development*. Alexandria, VA: Association for Supervision and Curriculum Development.

Hart, E.P. & Robottom, T.M. (1990) The science-technology-society movement in science education: A critique of the reform process. *Journal of Research in Science Teaching, 27*, 575-588.

Huberman, M. (1991). Teacher development and instructional mastery. In A. Hargreaves & M. Fullan (Eds.), *Understanding teacher development*. London: Cassells.

McNiff, J. (1993). *Teaching as learning: An action research approach*. London: Routledge.

Patton, M.Q. (1990). *Qualitative evaluation and research methods (2nd ed.)*. Newbury Park, CA: Sage Publications

Robottom, T.M. (1987). Two paradigms of prõfessional development in environmental education. *The Environmentalist, 7*, 291-298.

Shulman, L.S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review, 57*, 1-22.

Appendix A

Project *INLAB*
Reflection on Current Practice: Guidelines and Procedures

Purpose

The literature suggests that changes in practice occur when practitioners have opportunities to reflect upon their current practice. Opportunities that enable practitioners to construct a profile of their current practice, to analyze data from their own classroom, to discuss their problems and solutions with colleagues, and to discuss their successes and failures. Thus, the purpose of this activity is to assist you in reflecting upon your current laboratory instruction and assessment practices.

Materials

You should have received the following materials to assist you in your self-reflection: 2 videotapes, notebook and a sealed envelope.

Procedures

You will develop a profile of a laboratory instructional unit, including the assessment techniques, for one class. Select a laboratory instructional unit that you consider to represent a typical laboratory unit. To develop your profile you will need to:

1. Videotape the laboratory from the beginning to the end. If you need to use additional videotapes you will be compensated at a later date.

    a. If possible, have an individual run the video camera. The individual should focus the camera such that you are at the center, include as much of the class as possible. If not possible to have an individual run the video camera, station the camera such that you are at the center and include as much of the class as possible. Depending on your situation, you may have to move the camera to accommodate changes in your location.
    b. If you have a remote mike available, please wear the mike as that will improve sound quality.
    c. Record your name, grade, date, and unit content on the videotape.

2. Keep a personal log of the instructional unit from the start to the end. Record your reflections of the instructional unit for each day. To assist your reflection you may wish to address these questions: What happened? What did I do? What did my students do? How do I feel about what happened? What did I want to happen? What problems occurred? What success occurred? Be sure and indicate the date and time for each entry.

3. Keep a copy of everything you provide to students during the unit--worksheets, handouts, lab sheets, tests, etc. Also, you will need to duplicate the textbook chapter, laboratory manual and your lesson plans related to the instructional unit.

4. After you have completed the instructional unit, open the sealed envelope and answer the questions and follow the procedures for using your videotapes to reflect upon your laboratory instructional unit. It is important that you not open the sealed envelope until you have completed the laboratory instructional unit. The reason for not peaking is to prevent a bias in your current practice. The self-reflection only has meaning and value when based on your current practice.

5. Select a segment of your videotape that you wish to share and reflect upon with a small group of colleagues at our next meeting. Also be prepared to discuss your laboratory profile.

Appendix B

Project *INLAB*
Alternative Assessment Assignment

Introduction/Purpose

Science educators are being called upon to reform how they assess students and to align assessment with their science curriculum and instructional approaches. The successful implementation of innovations in science teaching rests on the development and use of appropriate assessment techniques, which are connected to the curricular and instructional innovation. Therefore, the purpose of this assignment is to engage you in developing, implementing, and reflecting upon alternative assessment techniques.

Procedures

You will develop, implement, and reflect upon two different alternative assessment techniques. To accomplish this you will need to:

1. Select two assessment instruments that you currently use and will use to evaluate your students between now and the end of school.

2. Develop one alternative assessment prototype for each of the above assessment instruments. This means you will develop two different alternative assessment prototypes. The alternative assessment prototypes need not assess every item covered on your original (current) assessment instruments. As you develop your alternative assessment prototypes be sure to include the following:

   - Student directions for completing the alternative assessment. Are the directions clear and concise? Is all necessary information provided?
   - Scoring rubric or matrix, which is used to judge student performance. Does the rubric reflect a range in student performance? Does the rubric state specific criteria for each level of performance?
   - Provide all necessary information for administering the alternative assessment prototypes to students; that is, will other teachers be able to use your prototypes?

   Note: This is a first attempt and you will need to revise your prototypes based on student responses. Alternative assessment techniques must be revised based on student responses in order to improve their reliability and validity.

3. Administer both your current assessment instruments and your alternative assessment prototypes to at least one class. Depending on the length of your assessment instruments you may want to administer your current assessment instruments on one day and your alternative assessment prototypes the next day.

4. Photocopy the student responses for all assessment instruments (current and alternative assessment prototypes), along with clean copies of each assessment instrument. You will need to turn in the photocopies with your reflection paper.

5. Based on the results for one class, write a reflection paper which compares and contrasts student outcomes between your current assessment instruments and the alternative assessment prototypes. The following questions may assist you in your reflection:

   - Did students exhibit a difference in their understanding? If so, in what ways? Why might this be? What is your evidence?
   - In your way of understanding, which instrument (current or alternative) best reflected student learning? Why do you think so? What is your evidence?

- What do you see as the benefits and difficulties with developing and implementing alternative assessment techniques? Give reasons for your views?
- Based on student responses, what ways would you modify your prototypes to improve their reliability and validity?

6. Revise your prototypes based on student responses and your reflection. Be sure to photocopy and turn in your revised prototypes.

7. Prepare a short (10-15 min.) small group presentation on your reflection paper. You should at least share examples of your alternative assessment prototypes, student evidence (results), and your general thoughts about the benefits and difficulties of alternative assessment techniques.

Appendix C

Project INLAB
Teachers Visiting Teachers
Assignment

Purpose

To visit other INLAB teachers to observe them implementing a thematic set--laboratory instruction and/or alternative assessment. To obtain ideas and methods for improving your own teaching and assessment practice.

Procedure

1. If you decide to participate, you will be assigned (based upon the three or four individuals you select from the enclosed list) one INLAB participant to visit during the implementation of that individuals thematic set. We will try to make reciprocal assignments (i.e., that individual would visit you in turn).

2. You and the assigned individual would coordinate the visit. Preferably you would spend two or more hours with the individual during the school day.

3. You (or your school) would need to cover the substitute for your time away. We will compensate you for your expenses, pending completion and return of the following items:

a. A video tape of the class session(s) that you observe. We will provide you with instr ctions on how to video tape the classroom. You will need to coordinate with the individual as to who will provide the camera. We will replace the tape you use.
b. Informal interviews with the students to be done while observing them in action during the lab component of the thematic set. We will provide you with an open-ended interview protocol.
c. An audio-taped interview with the individual. We will provide you with a standard interview protocol much like the interview that was used last year. You will need to coordinate with the individual as to who will provide the tape recorder. We will replace the tape you use.
d. A two-page report that summarizes the individual's answers to the interview, student responses to the informal interview, and your reflections of the experience.

Table 1. Categories of Change in Laboratory Teaching Practice

CHANGE IN LABORATORY TEACHING PRACTICE (24)	NO CHANGE IN LABORATORY TEACHING PRACTICE (6)
New knowledge/understanding of practice. (8)	New knowledge/understanding of current practice. Change in knowledge but not in practice--innovation consistent with practice. (3)
New ways of teaching using laboratories. (16)	Maintains traditional way of teaching using laboratories. (3)

Table 2. Categories of Change in Assessment Practice

CHANGE IN ASSESSMENT PRACTICE (27)	NO CHANGE IN ASSESSMENT PRACTICE (3)
New knowledge/understanding of practice. (13)	New knowledge/understanding of current practice. Change in knowledge but not in practice--innovation consistent with practice. (1)
Assessment seen as a learning tool, seamless to instruction. (6)	Maintains traditional way of assessment due to perceived inner--school conflicts. (2)
Assessment seen as related to laboratory instruction, aligning assessment with teaching. (8)	